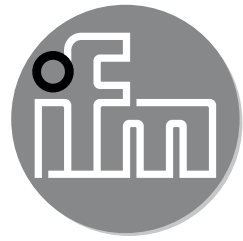


ifm electronic



Operating instructions
Pressure sensor
for homogenisers

efector500[®]

PY9000

UK

701872/00 08/04

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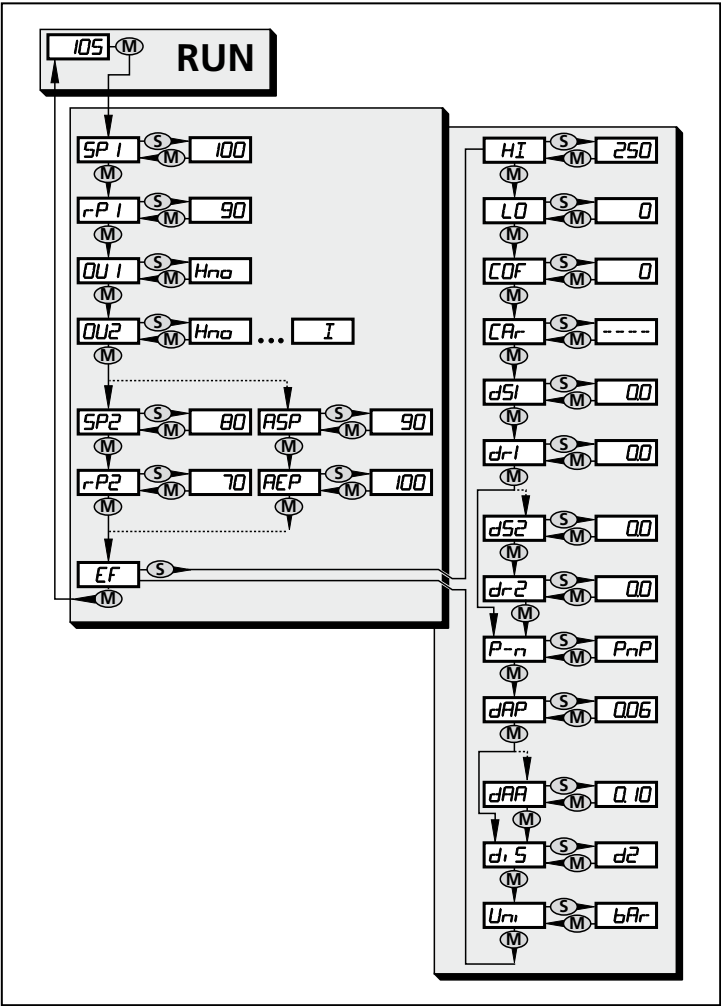
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1 Menu structure



2 Safety instructions

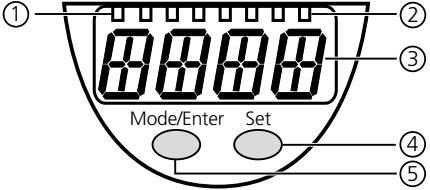
Read the product description before installing the unit. Ensure that the product is suitable for your application without any restrictions.

Non-adherence to the operating instructions or technical data can lead to personal injury and/or damage to property.

In all applications check compliance of the product materials (see Technical data) with the media to be measured.

For gaseous media the application is limited to max. 25 bar.

3 Controls and indicating elements



1	3 x LED green	Lighting LED = set display unit.
2	2 x LED yellow	Switching status; lights if the respective output has switched.
3	4-digit alphanumeric display	Display of the system pressure, display of parameters and parameter values.
4	Set button	Setting of the parameter values (scrolling by holding pressed; incremental by pressing briefly).
5	Mode / Enter button	Selection of the parameters and acknowledgement of the parameter values.

4 Function and features

- The pressure sensor detects the system pressure.
- It shows the current system pressure on its display.
- It generates 2 output signals according to the set output configuration.


	Output 1	Output 2
Analogue output (only output 2)		I: 4 ... 20 mA
		U: 0 ... 10 V
Switching function (output 1 and output 2; function can be selected for each output separately)	hysteresis function / N.O. (Hno)	
	hysteresis function / N.C. (Hnc)	
	window function / N.O. (Fno)	
	window function / N.C. (Fnc)	
Output polarity (applies to both switching outputs)	p-switching (PnP)	
	n-switching (nPN)	

Applications

Type of pressure: relative pressure

Order no.	Measuring range		Permissible overload pressure		Bursting pressure	
	bar	PSI	bar	PSI	bar	PSI
PY9000	0...600	0...8 700	800	11 600	1 200	17 400

$MPa = bar \div 10 \text{ / } kPa = bar \times 100$

 Static and dynamic overpressures exceeding the indicated overload pressure are to be avoided by taking appropriate measures.

The indicated bursting pressure must not be exceeded. Even if the bursting pressure is exceeded only for a short time, the unit can be destroyed.

NOTE: Risk of injury!

5 Operating modes

5.1 Run mode

Normal operating mode

At power on the unit is in the Run mode. It carries out its measurement and evaluation functions and provides output signals according to the set parameters.

The display shows the current system pressure (can be deactivated). The yellow LEDs indicate the switching state of the outputs.

5.2 Display mode

Indication of parameters and the set parameter values

When the "Mode/Enter" button is pressed briefly, the unit passes to the Display mode which allows parameter values to be read. The internal sensing, processing and output functions of the unit continue as if in Run mode.

The parameter names are scrolled with each pressing of the "Mode/Enter" button.

When the "Set" button is pressed briefly, the corresponding parameter value is displayed for 15 s. After another 15 s the unit returns to the Run mode.

5.3 Programming mode

Setting of the parameter values

While viewing a parameter value pressing the "Set" button for more than 5 s causes the unit to enter the programming mode. You can alter the parameter value by pressing the "Set" button and confirm the new value by pressing the "Mode/Enter" button. The internal sensing, processing and output functions of the unit continue as if in Run mode with the original parameter values unless a new value is confirmed. The unit returns to the Run mode when no button has been pressed for 15 s.

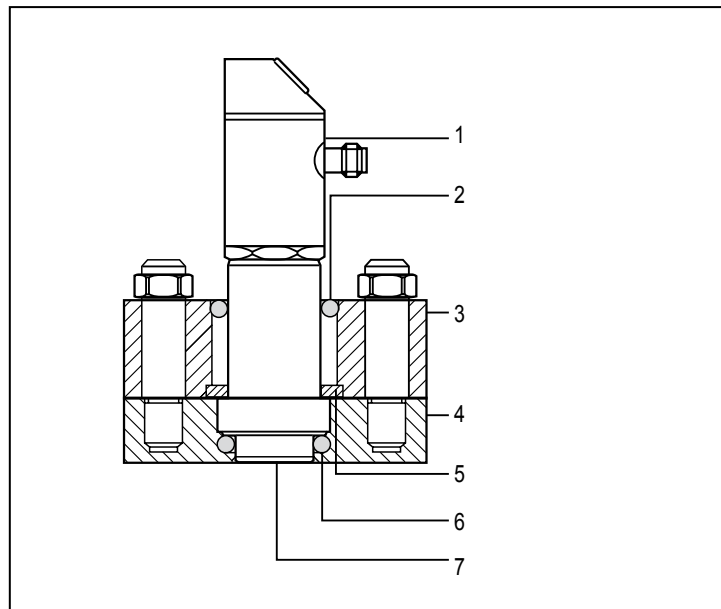
6 Installation



Before mounting and removing the sensor, make sure that no pressure is applied to the system.

Follow the instructions of the manufacturer of your plant. Use the mounting and sealing materials specified by the manufacturer of the plant.

Schematic installation drawing:



- 1: pressure sensor PY9000
- 2: O-ring
- 3: clamping flange
- 4: process adapter
- 5: clamp
- 6: O-ring
- 7: measuring pressure cell

7 Electrical connection

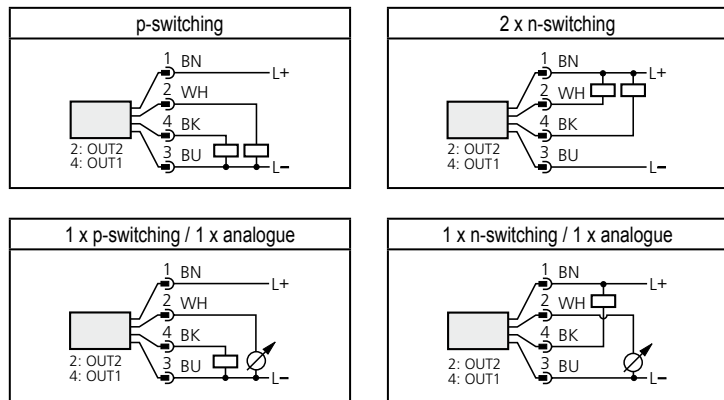


The unit must be connected by a suitably qualified electrician.

The national and international regulations for the installation of electrical equipment must be observed.

Voltage supply to EN50178, SELV, PELV.

Disconnect power before connecting the unit as follows:



Core colours of ifm sockets:

1 = BN (brown), 2 = WH (white), 3 = BU (blue), 4 = BK (black).

8 Programming

1		Press the Mode/Enter button several times until the respective parameter is displayed.
2		Press the Set button and keep it pressed. The current parameter value flashes for 5 s, then the value is increased* (incremental by pressing briefly or scrolling by holding pressed).
3		Press the Mode/Enter button briefly (= acknowledgement). The parameter is displayed again, the set parameter value becomes effective.
4	Change more parameters: Start again with step 1.	Finish programming: Wait for 15 s or press the Mode/Enter button until the current measured value is indicated again.

*Decrease the value: Let the display of the parameter value move to the maximum setting value. Then the cycle starts again at the minimum setting value.

Select the display unit (Uni) before setting the values for the parameters SPx, rPx, ASP, AEP. This avoids rounding errors generated internally during the conversion of the units and enables exact setting of the values.

Setting at the factory: bar / mbar.

If no button is pressed for 15 s during the setting procedure, the unit returns to the Run mode with unchanged values.

The unit can be electronically locked to prevent unwanted adjustment of the set parameters: Press both pushbuttons until **Loc** is displayed. To unlock: Press both pushbuttons until **uLoc** is displayed.

Units are delivered from the factory in the unlocked state.

With the unit in the locked state **Loc** is indicated briefly when you try to change parameter values.

9 Installation and set-up / operation

After mounting, wiring and setting check whether the unit operates correctly.

Faults displayed during operation:

OL	Overload (above measuring range of the sensor).
UL	Underload (below measuring range of the sensor).
SC 1	Flashing: short circuit in the switching output 1*.
SC 2	Flashing: short circuit in the switching output 2*.
SC	Flashing: short circuit in both switching outputs*.

*The output concerned is switched off as long as the short circuit continues. This faults are indicated even if the display is deactivated.

10 Technical informations / Functioning / Parameters

10.1 Adjustable parameters

SP 1 SP 2	Switch-on point 1 / 2: Upper limit value at which the output changes its switching status. SP2 is active only if OU2 = Hno, Hnc, Fno or Fnc. Setting range: 6...600 bar, in steps of 3 bar.
rP 1 rP 2	Switch-off point 1 / 2 Lower limit value at which the output changes its switching status. rPx is always lower than SPx. The unit only accepts values which are lower than SPx. Changing the switch-on point also changes the switch-off point (the distance between SPx and rPx remains constant). If the distance is higher than the new switch point, it is automatically reduced (rPx is set to the minimum setting value). rP2 is active only if OU2 = Hno, Hnc, Fno or Fnc. Setting range: 3...597 bar, in steps of 3bar.
OU 1	Configuration of output 1 4 switching functions can be set: - Hno = hysteresis / normally open - Hnc = hysteresis / normally closed - Fno = window function / normally open - Fnc = window function / normally closed

OU2	Configuration of output 2 4 switching functions and 2 analogue signals can be set: - Hno = hysteresis / normally open - Hnc = hysteresis / normally closed - Fno = window function / normally open - Fnc = window function / normally closed - I = analogue output 4 ... 20 mA - U = analogue output 0 ... 10 V
ASP	Analogue start point Measured value at which 4 mA / 0 V is provided. ASP is active only if OU2 = I or U. Setting range: 0...240 bar, in steps of 3 bar.
AEP	Analogue end point Measured value at which 20 mA / 10 V is provided. Minimum distance between ASP and AEP = 25% of the final value of the measuring range (scaling factor 4). AEP is active only if OU2 = I or U. Setting range: 150...600 bar, in steps of 3 bar.
EF	Enhanced functions This menu item contains a submenu with additional parameters. You can access these parameters by pressing the SET button briefly.
HI LO	Min-Max memory for system pressure • HI: displays the highest measured pressure • LO: displays the lowest measured pressure Erase the memory: - Press the "Mode/Enter" button until HI or LO is displayed. - Press the "Set" button and keep it pressed until "- - -" is displayed. - Then press the "Mode/Enter" button briefly.
COF	Calibration offset The internal measured value (operating value of the sensor) is offset against the real measured value. • Setting range: -5 ... +5% of the span (with scaling as factory setting (ASP = 0% and AEP = 100%)). • in steps of 0.1% of the span.
CAR	Calibration reset Resets the calibration set by COF to the value set at the factory. - Press the "Mode/Enter" button until CAR is displayed. - Press the "Set" button and keep it pressed until "- - -" is displayed. - Then press the "Mode/Enter" button briefly.

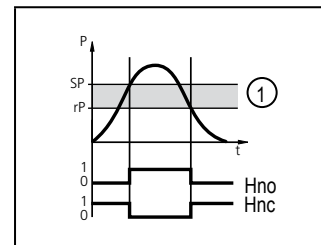
dS 1 dS2 dr 1 dr2	Delay time for the switching outputs dSx = switch-on delay; drx = switch-off delay. The output does not immediately change its switching status when the switching condition is met but when the delay time has elapsed. If the switching condition is no longer met when the delay time has elapsed, the switching state of the output does not change. • Setting range: 0 / 0.1 ... 50 s adjustable in steps of 0.1 s (0 = delay time not active). • Indicated in seconds. dS2 and dr2 are not active, if OU2 = I or U.
P-n	Output polarity 2 options can be selected: - PnP = positive switching - nPn = negative switching This setting applies to both switching outputs.
dAP	Damping for the switching outputs Pressure peaks of short duration or high frequency can be filtered out. dAP-value = response time between pressure change and change of the switching status in seconds (s). • Setting range: 0 ... 4 s (0 = dAP is not active), in steps of 0.01 s. Correlation between switching frequency and dAP: $f_{\max} = \frac{1}{2 \times dAP}$
dAA	Damping for the analogue output Pressure peaks of short duration or high frequency can be filtered out. dAA-value = response time between pressure change and change of the switching status in seconds (s). • setting range: 0 (= dAA is not active) / 0.1 s / 0.5 s / 2 s. dAA is active only if OU2 = I or U.
d, S	Setting of the display 9 options can be selected: d1 = update of the measured value every 50 ms. d2 = update of the measured value every 200 ms. d3 = update of the measured value every 600 ms. The update interval only refers to the display. It has no effect on the outputs. Ph = display of the measured peak value remains for a short time (peak hold). rd1, rd2, rd3, rPh = display as d1, d2, d3, Ph; but rotated 180°. OFF = In the Run mode the display of the measured value is deactivated. If one of the buttons is pressed, the current measured value is displayed for 15 s. Another press of the Mode/Enter button opens the Display mode. The LEDs remain active even if the display is deactivated.

Uni	Display unit The measured value and the values for SPx, rPx, ASP, AEP can be displayed in the following units: • bar • PSI • MPa Select the display unit before setting the values for the parameters SPx, rPx, ASP, AEP, COF. This avoids rounding errors generated internally during the conversion of the units and enables exact setting of the values. Setting at the factory: Uni = bAr.
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Hysteresis function

The hysteresis keeps the switching state of the output stable if the system pressure varies about the preset value. With the system pressure rising, the output switches when the switch-on point has been reached (SPx). With the system pressure falling the output does not switch back until the switch-off point (rPx) has been reached.

The hysteresis can be adjusted: First the switch-on point is set, then the switch-off point with the requested distance.

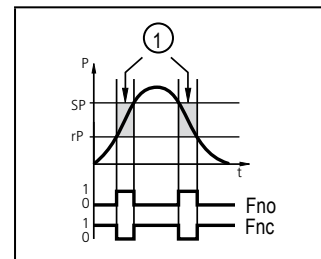


1: Hysteresis

Window function:

The window function enables the monitoring of a defined acceptable range. When the system pressure varies between the switch-on point (SPx) and the switch-off point (rPx), the output is switched (window function / NO) or not switched (window function / NC).

The width of the window can be set by means of the difference between SPx and rPx. SPx = upper value, rPx = lower value.



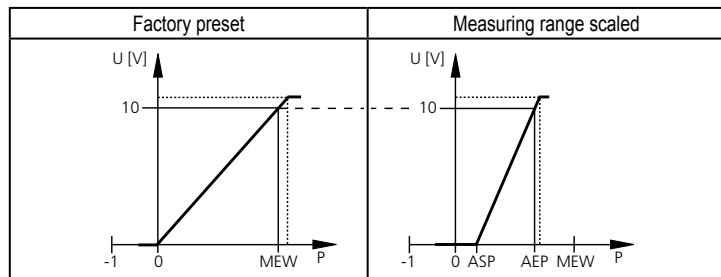
1: Acceptable range

Scaling the measuring range (analogue output)

- With the parameter "Analogue start point" (ASP) the measured value at which the output signal is 4 mA or 0 V is defined.
- With the parameter "Analogue end point" (AEP) the measured value at which the output signal is 20 mA or 10 V is defined.

Minimum distance between ASP and AEP = 25 % of the span (scaling factor 4).

Voltage output (0 ... 10 V)

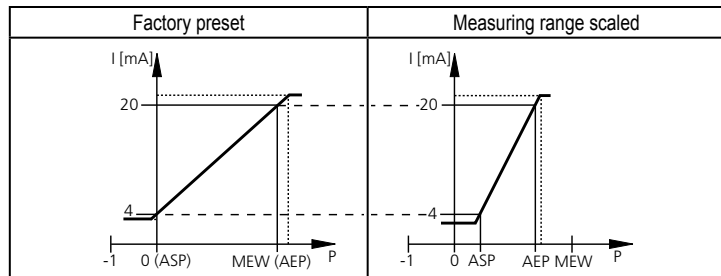


MEW = final value of the measuring range

The output signal is between 0 and 10 V in the set measuring range.

It is also indicated: System pressure above the measuring range: output signal > 10 V.

Current output (4 ... 20 mA)



MEW = final value of the measuring range

The output signal is between 4 and 20 mA in the set measuring range.

It is also indicated:

- System pressure above the measuring range: output signal > 20 mA.
- System pressure below the measuring range: output signal drops to max. 3.2 mA (depending on the scaling).

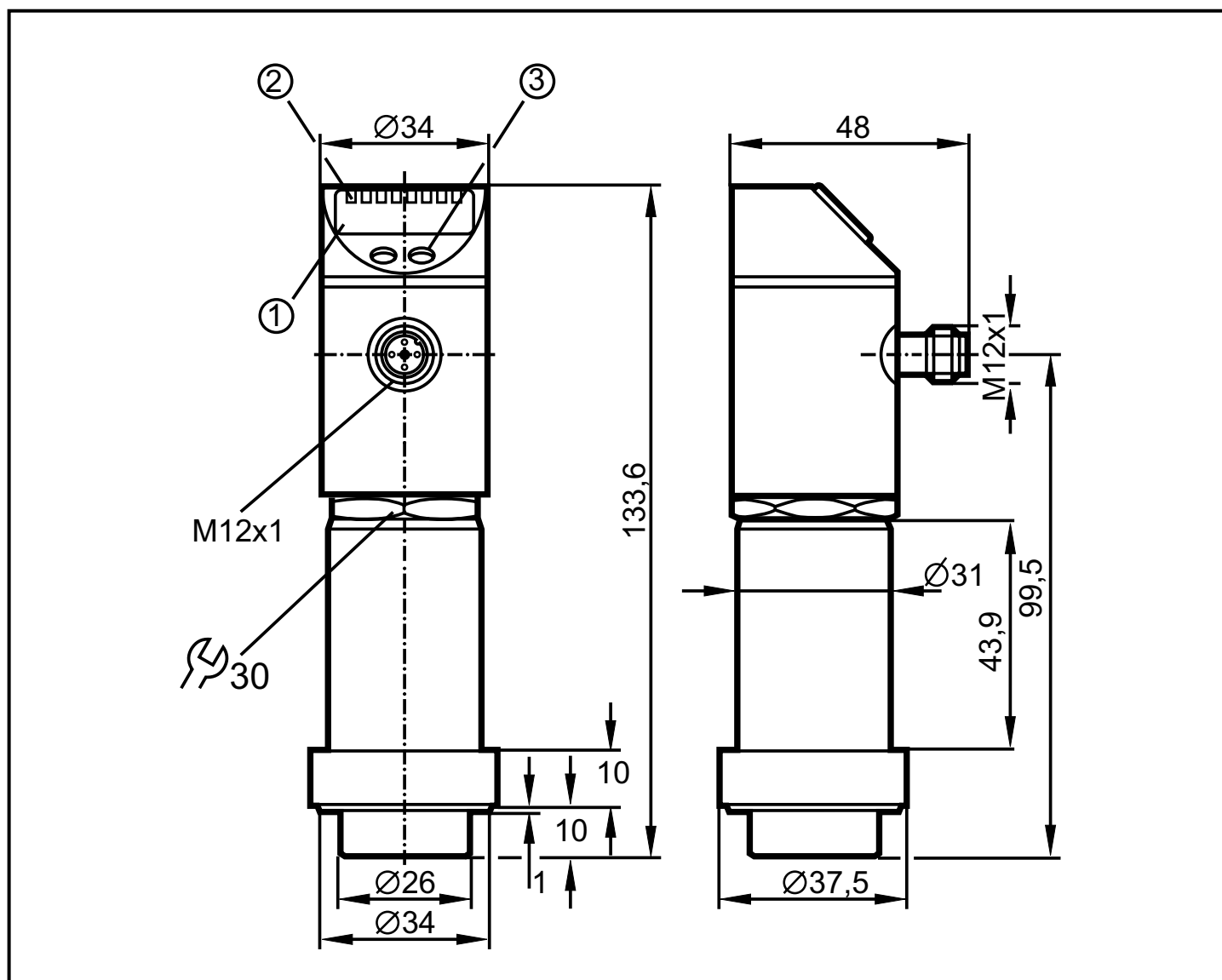
10.2 Technical data

Operating voltage [V]	20 ... 30 DC
Current consumption [mA]	< 65
Current rating [mA]	250
Short-circuit prot., reverse polarity prot. / overload prot., watchdog	
Voltage drop [V]	< 2
Power-on delay time [s]	0,2
Min. response time switching outputs [s]	0,25
Switching frequency [Hz]	170...0,125
Analogue output	4 ... 20 mA / 0 ... 10 V
Max. load current output [Ω]	$(U_B - 10) \times 50$; 700 bei $U_B = 24V$
Min. load with voltage output [Ω]	2000
Min. response time analogue output [ms]	3
Accuracy / deviations (in% of the span) ¹⁾	
- Accuracy of switch point	< ± 1.0
- Characteristics deviation (linearity, incl. hysteresis and repeatability) ²⁾	< ± 1.0
- Linearity	< ± 0.5
- Hysteresis	< ± 1.0
- Repeatability (with temperature fluctuations < 10K)	< ± 0.25
- Long-time stability (in% of the span per year)	< ± 0.25
- Temperature coefficients (TEMPCO) in the compensated temperature range 0 ... +80°C (in% of the span per 10 K)	< ± 0.25
- greatest TEMPCO of the zero point / of the span	< ± 0.2 / < ± 0.2
Materials (wetted parts)	stainless steel 316L / 1.4404; ceramics (96 % Al ₂ O ₃); FFKM
Housing material	stainless steel (304S15); stainless steel 316L / 1.4404; PC (Makrolon); PBT (Pocan); PA; FPM (Viton); EPDM/X (Santoprene)
Protection	IP 67 III
Insulation resistance [$M\Omega$]	> 100 (500 V DC)
Shock resistance [g]	50 (DIN / IEC 68-2-27, 11ms)
Vibration resistance [g]	20 (DIN / IEC 68-2-6, 10 - 2000 Hz)
Switching cycles min.	100 million
Operating temperature / storage temperature [°C]	-25 ... 80 / -40...100
Medium temperature [°C]	-25 ... 100 (145 max 1 h)
EMC	EN 61000-4-2 ESD: 4 / 8 kV
	EN 61000-4-3 HF radiated: 10 V/m
	EN 61000-4-4 Burst: 2 kV
	EN 61000-4-5 Surge: 0,5 / 1 kV
	EN 61000-4-6 HF conducted: 10 V

¹⁾ to EN50178, SELV, PELV

²⁾ all indications are referred to a turn down of 1:1

11 Scale drawing



- 1: 4-digit alphanumeric display
2: LEDs (display unit / switching status)
3: Programming button